

**Music + STEM**

**Upward Bound, Summer 2013, 10:50-11:50am**  
**Greg Crowther (crowther@uw.edu; 206-685-2857)**  
**<http://faculty.washington.edu/crowther/Teaching/UB/>**

## DESCRIPTION

Students will learn foundational STEM (Science, Technology, Engineering, & Mathematics) content through the medium of music. In particular, this course will cover foundational principles of molecular and cellular biology (DNA replication, transcription, translation) from an engineering perspective, examining how evolution has optimized cellular processes and how such processes may be altered for medical, industrial, and agricultural purposes. Additional sessions will cover the historical roots of contemporary popular music and the fundamentals of songwriting.

## COURSE STRUCTURE

Most class meetings will include mini-lectures followed by small-group exercises. These exercises will often merge scientific and musical content (e.g., “Write a verse concerning the lac operon in the format of a blues song”). As a final project, teams of students will create original songs that elucidate STEM content.

## REQUIREMENTS &amp; GRADING

As with the rest of the Upward Bound program, consistent attendance and active participation are expected. Students come into this course with varying levels of scientific and musical experience, so grades will reflect students’ effort and progress in grappling with the material, as well as the quality of their work. The final course grade will be determined as follows:

Class participation	25%
Weekly mini-essays	30%
Music analysis paper	15%
Final project	30%

Details of these assignments will be provided in class.

## INSTRUCTORS &amp; OFFICE HOURS

Greg Crowther of the UW Department of Medicine (crowther@uw.edu; 206-685-2857) will be the primary instructor for this course. He will hold an “office hour” from 12:00 to 12:50 PM at the By George café after every non-Tuesday class (see schedule below).

Additional instructors are as follows:

- David Aarons (teaching assistant), UW Department of Music, daarons7@uw.edu
- Katie Davis (course assessment), UW Information School, kdavis78@uw.edu
- Steve Korn (music history), UW Department of Music, stvkrn@uw.edu

## READINGS &amp; REFERENCES

There is no textbook for this course. In general, readings will be shared in class and via links from the course website (<http://faculty.washington.edu/crowther/Teaching/UB/>). References to be consulted include the following:

- G. J. Crowther, C. C. Speake, A. A. McBride, and M. E. Lidstrom. Molecular and cell biology: an engineering perspective (2007). In: G. Alterovitz and M. Ramoni, eds. *Systems bioinformatics: an engineering case-based approach*. Artech House Publishers.
- G. J. Crowther and K. Davis. “Amino Acid Jazz”: amplifying biochemistry with content-rich music. *Journal of Chemical Education*: in revision.

## TENTATIVE SCHEDULE

WEEK	DATE	DAY	TOPIC/ACTIVITY	VENUE
1	JUNE 26	W	Course welcome/overview. Students introduce selves and share favorite music/musicians. Show examples of student-made STEM music videos. Informed consent and formative assessment (surveys).	Parrington 212
	JUNE 27	Th	STEM lesson: DNA replication, transcription, translation	Parrington 313
	JUNE 28	F	STEM lesson: protein structure and function	Parrington 313
2	JULY 1	M	"Amino Acid Jazz" exercise	Parrington 313
	JULY 2	T	Music genre lesson: the blues (Steve Korn)	Schmitz 580
	JULY 3	W	"Amino Acid Jazz" follow-up	Parrington 313
3	JULY 8	M	STEM lesson: the cellular "factory"	Parrington 313
	JULY 9	T	Songwriting lesson: rhythm	Parrington 313
	JULY 10	W	Music genre lesson: rock 'n roll (Steve Korn)	Schmitz 580
	JULY 11	Th	STEM lesson: genetic engineering	Parrington 313
4	JULY 15	M	Songwriting lesson: lyrics	Parrington 313
	JULY 16	T	Workshop day: students write song snippets on assigned STEM topic in assigned genre	Parrington 313
	JULY 17	W	Music genre lesson: Motown/soul/R&B (Steve Korn)	Schmitz 580
	JULY 18	Th	STEM lesson: metabolic engineering	Parrington 313
5	JULY 22	M	Songwriting lesson: song structure	Parrington 313
	JULY 23	T	Workshop day: students write song snippets on assigned STEM topic in assigned genre	Parrington 313
	JULY 24	W	Begin planning final songs	Parrington 313
	JULY 25	Th	Library research on topics for final songs	Library/ computer lab
6	JULY 29	M	Brainstorm/start writing final songs	Parrington 313
	JULY 30	T	Library research on topics for final songs	Library/ computer lab
	JULY 31	W	Finish writing final songs	Parrington 313
	AUG. 1	Th	Rehearse/prepare for awards ceremony performances; final surveys	Parrington 313